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Intellectual Property Status:

Patent Pending

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Hybrid Separation and Detection Device for Chemical Detection and Analysis

AzTE Case # M10-006

Invention Description

BTEX is a complex group of aromatic volatile organic compounds (<u>B</u>enzene, <u>T</u>oluene, <u>E</u>thylbenzene, and <u>X</u>ylenes) associated with automobile exhaust pollution. Many epidemiological studies have linked elevated levels of BTEX to adverse human health effects.

Measuring BTEX usually requires the use of gas chromatography and mass spectrometry (GC-MS). This instrumentation is bulky, expensive, and slow. For occupational health and safety applications as well as for toxicological population studies, it would be desirable to have a small, lightweight, fast and inexpensive alternative to GC-MS that at the same time had all the necessary capabilities for BETEX detection and quantitation.

To address this challenge, researchers at the Biodesign Institute of Arizona State University have developed a hybrid detection device. The device is composed of a dedicated gas chromatography unit that separates the various gas-phase chemical pollutants. This is combined with a novel detection stage that can identify the different chemical moieties. The novel detection stage unit is based on an array of quartz crystal tuning fork sensors modified to specifically respond to BTEX components.

This device has been constructed and tested in a variety of environments with excellent results as compared to the gold standard of GC-MS.

Potential Applications

- Environmental contaminants monitoring
- Toxicology
- Occupational health and safety monitoring
- Detection of explosives (with modification of the senor arrays)

Benefits and Advantages

- **Portable**: Miniaturized palm size device allows direct field use.
- Fast: Results within 3-4 minutes
- Low-cost: Inexpensive components and low power consumption
- **Convenient**: Wireless transmittal of data permits instantaneous analysis.
- Versatile: Technology can be adapted to detect a variety of chemicals.